

seismic phenomena, as we should expect to find them in a text-book, the author has given a concise history of eight disturbances, each of which has a special interest. The Neapolitan earthquake is of interest from an historical point of view, the Ischian earthquakes illustrate the relationship between volcanic and seismic activities, a Japanese earthquake is described on account of the fault line which was produced at the time of its occurrence and the numerous after-shocks by which it was followed, whilst a British earthquake illustrates the growth of a fault. From the work of Robert Mallet upon the first of these earthquakes, which in 1857 devastated a district to the south-east of Naples, and when upwards of 9000 people lost their lives, the scientific world learned that out of ruins much might be learned respecting the direction and intensity of the movements which had caused them. Although his methods of investigation, as, for example, those relating to the determination of the depths of seismic foci, may have been modified by new observations, Mallet directed attention to new problems for the solution of which he employed scientific methods.

The Andalusian earthquake in 1884, we are told, is chiefly remarkable from the fact that it was recorded at very distant stations, as, for example, by magnetographs near Paris, at which city the movements of the ground could not be felt. For this disturbance the depth of its origin is determined by means of angles of emergence calculated from the directions of fractures in masonry walls. That the direction of these fractures might be due to the varying steepness of the earth waves which produced the shattering is not considered.

The peculiarity of the Charleston earthquake is that it occurred in a region where such disturbances are almost unknown, that it had two foci about thirteen miles apart, and that it illustrated the behaviour of different races when confronted by a terrible disaster. With the negroes there was wild fear, panic, and a "selfish rush for safety." With Europeans in similar circumstances similar conditions prevail, but we are told that with Japanese there is calmness. Our own idea is that Japanese like to save their necks as well as other people. They will bolt at the time of an earthquake, to return, not with hysterical and shattered nerves, but chattering and laughing as if earthquakes were very fine jokes.

A subject attractive to the general reader which is referred to in several chapters is an account of signs which have given warning of a coming earthquake. Underground sounds have been heard, springs have varied in their flow, horses, birds, dogs, and even human beings have been restless for some time before great earthquakes. In his reference to the Riviera earthquake in 1887, Mr. Davison remarks that as premonitions were noted at 130 different places within the central area, "there can be little doubt that they were caused by microseismic movements for the most part insensible to man." In these days of psychical research we think that the author has lost an opportunity for romantic speculation.

Although the book is intended more for the person

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of ordinary intelligence than for the specialist, here and there we come upon information of an uncommon kind. For example, it is pointed out that the areas over which earthquake sounds are heard is variable in different countries. One reason for this is that the limits of audibility vary with different races. From illustrations given it would appear that for certain sounds the Anglo-Saxon ear is more acute than the Neapolitan, and very much more than that of the Japanese. This relationship between the physiological structure of the human ear and earthquake music is, to say the least, extremely interesting, but while discussing the same the fact must not be overlooked that in the same country districts may be found where seismic sounds are frequent, whilst there are other districts where Pluto shakes the ground but mutterings are never heard.

Dr. Davison's book is well worth reading, whilst the manner in which its contents have been arranged should obtain for it a circulation amongst those who seek for general information.

OUR BOOK SHELF.

A German-English Dictionary of Terms used in Medicine and the Allied Sciences. By Hugo Lang and B. Abrahams. Pp. vi + 598. (London: J. and A. Churchill, 1905.) Price 15s. net.

THERE is undoubtedly a vacant place which would be filled by a well-compiled work bearing the above title. The book now under review has a certain claim on our regard in this connection, and in some respects is a useful work. It purports to be, in the first place, a medical dictionary, and, so far as we can judge, fulfils this promise in a satisfactory manner. With a few minor blemishes there is a complete vocabulary of medical terms, and as a rule these are very fairly rendered by their English equivalents. But in the allied sciences, which are also supposed to be included, there are curious lacunæ. Chemistry is pretty well represented—for example, we found most of the technical terms in Biedermann's "Chemiker Kalender" duly set down—but the pathological vocabulary leaves much to be desired, and apparently physiology is not considered an allied science at all—at any rate, physiological terms are very seldom to be met with.

The authors have generally avoided the pitfalls set for the unwary in works of this kind, and there are few actual mistakes; occasionally it is difficult to ascertain the real meaning of a word without extraneous assistance. For example, the word "typhus" by itself is not correctly translated by "typhus"; it invariably means "enteric" (typhoid), and the English typhus fever is "fleck-typhus," the latter being, however, correctly entered in its place. The medical meaning of "Belastung" is given; the completely different signification when the word is applied to muscle is omitted. But the cardinal fault of the dictionary is the treatment of compound words. These are separately set forth at length instead of being collected under their first components, and this increases the bulk and cost of the work (already too great) without conferring any real ease of reference. The courteous way in which the authors in the preface invite suggestions disarms too caustic comments, and we merely hint gently that in the next edition the space that could be saved by the course indicated could be profitably employed by the

insertion of a few additional pathological and physiological terms, and that it would be unwise to translate these in the fashion adopted at present in such words as "luftweg."

Règles internationales de la Nomenclature zoologique. Pp. 63. (Paris: F. R. de Rudeval, 1905.)

It has frequently been remarked that it is not of much use making laws and regulations unless you have the power to enforce their observation; and this trite saying applies, in our opinion, very forcibly to this code of regulations for zoological literature, drawn up by an international committee the deliberations of which have extended over some years. The code, which is published in three languages, is admirably drawn up, and for the most part free from ambiguity; but the question is, will naturalists agree to abide by it? In our opinion, a large number will refuse to accept it, since a rigid and slavish adherence to the law of priority is enjoined, and to many this is anathema. The rule that when a genus-name is changed this entails the change of the family title will be generally regarded as satisfactory. As regards emendation in names, this is held to be justifiable only when an error in transcription, a *lapsus calami*, or a misprint is apparent; but in the interpretation of this difficulties may arise, as in the well-known case of *Neurogymnurus*, which is believed to be an error for *Necrogymnurus*. Differences of opinion, again, are likely to arise with regard to the rejection of names on account of unsuitableness or similarity to others already in use. The retention of such names as *Polyodon* and *Apus* when applied to animals which do not properly come under such designation will, no doubt, be generally accepted; but what is to be said when, for instance, an essentially African species is named *asiaticus*? Such names as *Polyodus*, *Polyodon*, *Polyodonta*, *Polyodontus*, &c., are held not to come under the category of synonyms, although the converse rule is followed in many systematic works and catalogues, such as Dr. Trouessart's "Catalogus Mammalium."

As a "pious" expression of opinion on the part of the International Committee the "Règles" are, no doubt, valuable; but they would have been much more so had a plebiscite of zoologists and palaeontologists agreed to accept and abide by the ruling of the committee.

R. L.

LETTERS TO THE EDITOR.

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A New Thallium Mineral.

THE element thallium, discovered by Sir W. Crookes in 1861, has up to the present been known as an essential constituent of only two minerals, viz. crookesite, a selenide of copper and thallium, and lorandite, a sulpharsenite of the latter element. To these minerals a third must now be added in hutchinsonite, a new sulpharsenite from the Binnenthal, which also contains thallium as an important constituent. The crystallographic characters of hutchinsonite were described about a year ago by Mr. R. H. Solly, who, of late years, has been particularly successful in discovering new mineral species in the Binnenthal. At the time of its discovery very little in the way of chemical investigation was possible owing to the extreme scarcity

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of the mineral, but during the past year additional crystals have been acquired for the British Museum, and from these about eighty milligrams of fairly pure material have been obtained for chemical analysis. Thallium is present (up to nearly 20 per cent.), together with lead, silver, and copper, in combination with arsenic and sulphur. A full description of the mineral will appear shortly in the *Mineralogical Magazine*.

G. T. PRIOR.

The Legendary Suicide of the Scorpion.

I HAVE recently come across the following passage in the Rev. John Campbell's "Travels in South Africa" (London, 1815), p. 38:—"Having caught a scorpion near our tent, we tried whether naturalists were accurate in relating, that if that animal be surrounded with fire, and sees he cannot escape, he will sting himself to death. However, it died as quietly as any other animal, only darting its sting from it, as if to oppose any ordinary assailant." The experiment was made near Zwellendam, Cape Colony, on February 20, 1813.

EDWARD B. POULTON.

Oxford, March 31.

Propagation of Earthquake Waves.

A FEW days ago I read Major C. E. Dutton's book on "Earthquakes in the Light of the New Seismology." While acknowledging the high merits of this book, I take the liberty of pointing out some statements which seem misleading.

I refer to chapter xiii., where the author, quoting the results of the experimental investigations of Mr. Nagaoka, gives the speeds V_1 and V_2 of the normal and transverse waves. Now a glance at the table on pp. 230 and 231 shows that for many rocks the two moduluses E_1 and E_2 , perpendicular and parallel to the bedding planes are far from being equal; on the contrary, the quotient E_1/E_2 varies so much as from $1.43/2.49$ for rhyolite tuff to $32.1/17.5$ for rhyolite. Hence the physical properties of the rocks in question are different in different directions, and the speeds of propagation of waves are also different in different directions, so that the speeds V_1 and V_2 of the table being the same for all directions have no real meaning for many rocks.

Again, in chapter xiii. and in other chapters of the book, the author refers to normal and transverse waves in rocks. It would be better, perhaps, to speak of dilatational and torsional waves; but leaving the question of terminology out of consideration, I observe that it is only for perfectly elastic homogeneous and isotropic bodies that the separation of the dilatational (normal) from the torsional (transverse) wave takes place with certainty. We have no right to extend this property to æolotropic bodies. When the body is æolotropic the deformation of an element on the passage of a wave need not be of a purely dilatational (normal) or of a purely torsional (transverse) character; it is rather of a mixed nature.

I will not say that æolotropic bodies able to propagate purely dilatational and purely torsional waves cannot exist, but I observe that such bodies are to be considered rather as possible exceptions, inasmuch as certain special conditions must be fulfilled in order that the generation of purely dilatational and purely torsional waves should be rendered possible. So, for example, the elastic potential of a perfectly elastic homogeneous uniaxial body implies five independent constants. When we introduce the condition that purely dilatational waves may be propagated apart from torsional ones, we find that two definite relations between the constants must be satisfied so that the number of independent constants is reduced to three. But we have no reason to maintain *a priori* that the conditions in question must be always satisfied.

Of course it is to be understood that a perfectly elastic homogeneous uniaxial body cannot be considered as an exact "model" of stratified rocks; it is only very similar to them; but it is more than highly improbable that the effect of internal friction would neutralise the effect of æolotropism.

M. P. RUDZKI.

K. K. Sternwarte, Krakau (Austria), March 24.